

**CONFIDENTIAL**

CLASSIFICATION    **CONFIDENTIAL**

CENTRAL INTELLIGENCE AGENCY  
INFORMATION FROM  
FOREIGN DOCUMENTS OR RADIO BROADCASTS

REPORT

50X1-HUM

CD NO.

COUNTRY    USSR

DATE OF  
INFORMATION    1950

SUBJECT    Scientific - Fuels

DATE DIST. <sup>21</sup> Jul 1950HOW  
PUBLISHED    Monthly periodicalWHERE  
PUBLISHED    Moscow

NO. OF PAGES    2

DATE  
PUBLISHED    Apr 1950SUPPLEMENT TO  
REPORT NO.

LANGUAGE    Russian

THIS DOCUMENT CONTAINS INFORMATION AFFECTING THE NATIONAL DEFENSE  
OF THE UNITED STATES WITHIN THE MEANING OF ESPIONAGE ACT OF  
U. S. C. 51 AND 52, AS AMENDED. ITS TRANSMISSION OR THE REVELATION  
OF ITS CONTENTS IN ANY MANNER TO AN UNAUTHORIZED PERSON IS PRO-  
HIBITED BY LAW. REPRODUCTION OF THIS FORM IS PROHIBITED.

THIS IS UNEVALUATED INFORMATION

SOURCE    Vestnik Akademii Nauk SSSR No 4, 1950.

A. S. PREDVODITELEV'S WORK  
ON THE COMBUSTION OF SOLID FUELS

A. S. Predvoditelev, Corresponding Member, Academy of Sciences USSR, and L. N. Khitrin and O. A. Tsukhanova, Senior Scientific Collaborators, Power Institute imeni G. M. Krzhizhanovskiy, Academy of Sciences USSR, together with other participants in the work in question, have been honored with the Stalin Prize, Second Class, for theoretical and experimental investigations on the process of solid fuel combustion which have been summarized in the monograph, Combustion of Carbon, published in 1949.

The basis of the theoretical analysis of carbon combustion carried out by Predvoditelev and his school is formed by the method of establishing the connection between physical and chemical factors of the process.

The above monograph consists of four parts. The first part gives a general physico-mathematical formulation of the problem of carbon combustion. The authors derive differential equations of combustion which take into account hydrodynamics and volume chemical reactions. They also define the conditions prevailing in the periphery, taking into account secondary reactions, diffusion, and the reaction with oxygen in the body of the carbon. In the course of this treatment, the important concept of reactive gas exchange coefficients is introduced, and the principal factors determining the process of combustion are defined.

The second part deals with combustion in carbon channels. On the basis of detailed experimental data, the characteristics of the reactions of carbon with oxygen and with carbon dioxide are expounded, and the effect of the volume reaction of carbon monoxide combustion on the process is brought out.

In the course of the work in question, the effect of the addition of iodine vapor on the yield of carbon monoxide has been discovered. A method for modifying differential equations of combustion in such a manner that the calculation of the process in complicated, practically important cases becomes possible, has been worked out.

**CONFIDENTIAL**

- 1 -

CLASSIFICATION		CONFIDENTIAL		DISTRIBUTION							
STATE	<input checked="" type="checkbox"/> NAVY	<input checked="" type="checkbox"/> NSRB									
ARMY	<input checked="" type="checkbox"/> AIR	<input checked="" type="checkbox"/> FBI									

CONFIDENTIAL

~~CONFIDENTIAL~~

50X1-HUM

In the third part, the combustion of individual carbon particles is investigated. A detailed critical analysis based on extensive experimental material, which the authors have carried out, shows that the coefficients of reactive gas exchange can be used for the practical definition of properties of fuels as far as combustion and gasification are concerned. The function of processes of internal reaction is defined, and the inhibiting effect of the carbon monoxide flame demonstrated. The combustion of carbon particles is treated completely, taking into consideration internal reaction, secondary and volume processes, and hydrodynamics. The results form a basis for calculations of the combustion of suspended coal dust.

In the fourth part, material on combustion in layers and in the form of suspended dust is presented. By means of an original method, the characteristics of the process are derived, and the factors which control and regulate combustion of elemental carbon and that of coal are established, and the fundamental similarity between the two processes is shown. By comparing theoretical results with experimental data, numerical values for the coefficients of reactive gas exchange are obtained which correspond to those found in the analysis of the processes of combustion of carbon particles and carbon combustion in channels.

The work reviewed above is of great practical significance because contemporary technology of combustion and gasification of coal requires the treatment of problems connected with improved utilization of low-grade fuels, underground gasification, use of solid fuel for gas turbines, etc. These problems can be solved only by studying the mechanism of solid fuel combustion, and by developing methods for the investigation of that process.

- E N D -

- 2 -

CONFIDENTIAL

~~CONFIDENTIAL~~